

REMARKS

Claims 1-25 remain in the application. The applicant has amended claim 19 to more clearly define the invention. In view of the amendment and the following arguments, the applicant respectfully submits that the pending claims 1-25 are in condition for allowance now.

I. Rejection of Claims 12-14 and 16-18 Under 35 U.S.C. 102(b)

Claims 12-14 and 16-18 have been rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,128,905 to Arnott. In particular, the Examiner took the position that Arnott teaches a linear transducer includes an armature assembly, a suspension assembly, and a coupler disk coupled to the suspension assembly, wherein a vibration in the armature assembly causes a corresponding vibration of the coupler disk according to a linear function of the input signal. The applicant respectfully disagrees with the Examiner's conclusion.

In the Office Action, the Examiner stated that Arnott discloses an armature assembly (Fig. 4, 32). However, from the disclosure of Arnott, it is clear that the assembly 32 in Arnott, which includes a circular frame 33 (column 4, line 43) is not an armature assembly. Therefore, Arnott does not anticipate claim 12.

Furthermore, in the present application, the linear transducer which includes an armature assembly, a suspension assembly, and a coupler disk, transforms an input signal to a vibration of the coupler disk according to a linear function of the input signal. In contrast, the "linear response" in Arnott (column 2, lines 15-22), as indicated by the Examiner, is a linear response of a piezoelectric membrane, which is used to transform a mechanical deformation to an electrical signal in the device disclosed in Arnott, but not from an input signal to an output vibration, as claimed in claim 12. Therefore, the invention as claimed in claim 12 in the present application is different from the device disclosed in Arnott, which uses a piezoelectric membrane to measure acoustic field. The applicant respectfully submits that claim 12 should be considered patentable over Arnott.

Claims 13, 14, and 16-18 depend from claim 12 and each include all the limitations of claim 12. Therefore, claims 13, 14, and 16-18 all should be considered patentable over Arnott.

II. Rejection of Claims 1-4 and 6-8 Under 35 U.S.C. 103

Claims 1-4 and 6-8 were rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,039,756 to Burtschi in view of Arnott.

In particular, the Examiner indicated that Burtschi teaches an electro-larynx comprising a waveform generator and a transducer configured to receive and transform an input signal into a corresponding output vibration which is a substantially linear function of the input signal. The Examiner further indicated that Burtschi does not teach a linear transducer, but Arnott teaches a linear transducer, and therefore, it would be obvious to one of ordinary skill in the art to combine the teaching of Burtschi into Arnott to provide a new and improved form of acoustic field transducer. The applicant respectfully disagrees with the Examiner's conclusion.

The applicant respectfully submits that Arnott is not an analogous prior art for the present invention. "In order to rely on a reference as a basis for rejection of an applicant's invention, the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned." (see MPEP 2141.01(a)) As indicated in the Background of the Invention in the present application, the prior art devices having non-linear transducers which produce speech that is very machine-like in sound. The present invention incorporates a linear transducer in the electro-larynx to transform an input signal to an output vibration. Arnott discloses an acoustic field transducer, which includes an elastic membrane made of piezoelectric material, for measuring acoustic field. Acoustic field measurement is in different field of art, and therefore, is not in the field of applicant's endeavor. The purpose of the present invention is to improve electro-larynx, so that the device can produce human speech-like sound. The disclosure of Arnott is directed to measurement of acoustic field. Therefore, the Arnott patent is not reasonable pertinent to the particular problem the inventor was concerned. Therefore, Arnott is nonanalogous art for the present invention.

Even if Arnott is considered as analogous art, it is not proper to combine Arnott with Burtschi to render the present invention obvious. The electro-larynx devices have been in the art for a long time prior to the present invention. These prior art devices, which use non-linear transducers, produce speech that is very machine-like in sound, with low levels of loudness and

intelligibility. However, the prior art has failed to identify the source of the problem, and thereby no prior art electro-larynx incorporates a linear transducer in the device to produce a better result. Arnott teaches that a “piezoelectric material has the particular advantage of providing the transducer with a linear response at or below the mechanical resonance frequency”. The fact that a piezoelectric material can produce a linear response between electrical and mechanical signals has been known in the art for a long time. However, no prior art electro-larynx has incorporated a piezoelectric device or a linear transducer to transform an input signal to an output vibration. This further proves that prior to the present invention, the prior art has failed to identify the source of the problem, and thereby fails to incorporate a linear transducer in an electro-larynx to provide more humanized sound. Therefore, the applicant respectfully submits that the Examiner’s conclusion that the present invention as claimed in claim 1 is obvious in view of Burtschi and Arnott is based on hindsight.

Moreover, as discussed in Section I with respect to the rejection to claim 12, the “linear response” provided by the piezoelectric material in Arnott is from a mechanical deformation to an output electrical signal, but not from an input signal to an output vibration as required by the claim in the present application. Therefore, the linear transducer in the present application is different from the device disclosed in Arnott. Because Arnott does not teach the linear transducer as claimed in claim 1 of the present application, the combination of Burtschi and Arnott cannot render the present invention obvious.

Therefore, based on the above argument, the applicant respectfully submits that the present invention as claimed in claim 1 is patentable over Burtschi in view of Arnott. Claims 2 and 8 depend from claim 1, and claims 3, 4, 6, and 7 depend from claim 2. Therefore, claims 2-4 and 6-8 all should be considered patentable over Burtschi in view of Arnott.

III. Rejection of Claims 19-21 Under 35 U.S.C. 103

Claims 19-21 were rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,400,434 to Pearson in view of U.S. Patent No. 4,797,926 to Bronson. Claim 19 is an independent claim and claims 20 and 21 depend on claim 19. Claim 19 has been amended by this amendment. The amended claim 19 claims an electro-larynx, which includes a waveform generator and a transducer for transforming an input signal generated by the waveform generator

to an output vibration of a throat engagement portion. The applicant believes that the amended claim 19 is patentable over the cited references now.

Pearson teaches a voice source for use with a text-to-speech transforming system. Bronson is directed to a speech analyzer and synthesizer system. The text-to-speech transforming system and speech analyzing and synthesizing device disclosed in Pearson and Bronson are in different field of art from the present invention (an electro-larynx), and therefore, Pearson and Bronson are not in the field of applicant's endeavor. The Applicant respectfully submit that Pearson and Bronson are nonanalogous prior art for the present invention.

Furthermore, claim 19 has been amended to more clearly define the invention. The amended claim 19 requires that the electro-larynx includes a waveform generator and a transducer. None of the prior art teaches the transducer element. Therefore, the amended claim 19 is believed to be patentable over Pearson in view of Bronson. Claims 20 and 21 depend from claim 19, and therefore, also should be considered patentable over Pearson in view of Bronson.

IV. Rejection of Claim 22 Under 35 U.S.C. 103

In Item 8 in the Office Action, claim 22 was rejected under 35 U.S.C. 103(a) as being unpatentable over Burtschi in view of U.S. Patent No. 4,401,850 to Harbeson. In particularly, the Examiner stated that Burtschi teaches an electro-larynx comprising a waveform generator, a transducer, and a power source, and Harbeson teaches an electro-larynx configured to generate an input signal having a harmonic structure corresponding to a normal glottal excitation (lines 39-56 in column 1). The applicant respectfully disagrees with the Examiner's conclusion.

Harbeson, at lines 39-56 in column 1, describes a structure of a human's larynx that generates sounds with harmonic characteristics, but is not a structure of an electro-larynx. Therefore, Harbeson fails to teach the present invention as claimed in claim 22, which is directed to an electro-larynx configured to generate an input signal having a harmonic structure corresponding to a normal glottal excitation. Burtschi also does not teach or suggest an electro-larynx configured to generate an input signal having a harmonic structure. Therefore, the combination of Burtschi and Harbeson cannot render the present invention as claimed in claim 22 obvious.

In Item 9 of the Office Action, claim 22 was also rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,821,326 to MacLeod.

Claim 22 claims an electro-larynx having a waveform generator configured to selectively generate an input signal, which has a harmonic structure corresponding to a normal glottal excitation. However, MacLeod teaches a non-audible speech generation device which generates output glottal pulses, in ultrasonic frequency range and in the approximate frequency spectrum extending from fifteen kilohertz to one hundred five kilohertz, contain harmonics of approximately 30 times the frequency of the acoustical harmonics generated by the vocal cords (lines 61-65 in column 2). The present invention is adapted to generate a relatively good approximation of a glottal source waveform, having a harmonic structure substantially similar to that of normal human speech. MacLeod patent is directed to a device that generates non-audible ultrasonic signals. It is clear that the signal generated by the device disclosed in MacLeod does not have a harmonic structure corresponding to a normal glottal excitation. Therefore, the present invention as claimed in claim 22 is different from the device disclosed in MacLeod. The applicant respectfully submits that the rejection based on 35 U.S.C. 103(a) should be reconsidered and withdrawn.

V. Rejections to Other Dependent Claims

Claim 15

In Item 6 of the Office Action, claim 15 was rejected under 35 U.S.C. 103(a) as being unpatentable over Arnott in view of the applicant's Background of the Invention section in the patent application.

Claim 15 depends from claim 12. Claim 12 is an independent claim. As discussed in Section I with respect to the independent claim 12, the independent claim 12 should be considered patentable over Arnott and the Background section of the present application. Claim 15 provides further limitations to claim 12, and therefore, should be considered patentable over the prior art.

Furthermore, as discussed above, the linear transducer in claim 12 is adapted to transform an input signal to an output vibration according to a linear function. The transducer in Arnott transforms a mechanical signal to an electrical signal. The armature assembly described in the

Background section in the application, which generally is for transforming an electrical signal to a mechanical vibration, cannot be applied to the device in Arnott. Therefore, the combination of Arnott and the Background section of the application cannot render claim 15 obvious.

Claims 23-25

In Item 10, claims 23-25 were rejected under 35 U.S.C. 103(a) as being unpatentable over MacLeod in view of Pearson and Bronson.

Claim 23 depends from claim 22 and claims 24 and 25 depend from claim 23. As discussed in section IV with respect to rejections to the independent claim 22, claim 22 should be considered patentable over MacLeod because MacLeod does not teach or suggest a waveform generator configured to selectively generate an input signal, which has a harmonic structure corresponding to a normal glottal excitation. Neither Pearson nor Bronson teaches a waveform generator having such features. Therefore, claim 22 should be patentable over MacLeod in view of Pearson and Bronson. Dependent claims 23-25 provide more limitations to claim 22 and also should be patentable over the cited references.

Claim 5

In Item 11, claim 5 was rejected under 35 U.S.C. 103(a) as being unpatentable over Burtschi in view of Arnott as applied to claims 1 and 2, and further in view of the Background of the Invention section in the application.

Claim 5 depends from claim 2, which depends from claim 1. As discussed in the argument with respect to claim 1, claim 1 should be patentable over Burtschi in view of Arnott. Because the prior art described in the Background section of the present application does not teach or suggest an electro-larynx having a linear transducer, claim 1 should be patentable over Burtschi in view of Arnott, and further in view of the Background of the Invention section in the application. Claim 5 provides further limitations to claim 1, and therefore, should be patentable over the prior art references.

Claim 9

In Item 12, claim 9 was rejected under 35 U.S.C. 103(a) as being unpatentable over Burtschi in view of Arnott as applied to claims 1 and 2, and further in view of Harbeson.

Claim 9 depends from claim 1. As discussed above, claim 1 should be patentable over Burtschi in view of Arnott. Harbeson also does not teach or suggest an electro-larynx having a linear transducer. Therefore, claim 1 should be patentable over Burtschi in view of Arnott, and further in view of Harbeson. Claim 9 provides further limitations to claim 1, and therefore, should be patentable over the cited references.

Claims 10-11

In Item 13, claims 10 and 11 were rejected under 35 U.S.C. 103(a) as being unpatentable over Burtschi in view of Arnott as applied to claim 1, and further in view of Pearson and Bronson.

Claim 10 depends from claim 1, and claim 11 depends from claim 10. As discussed above, claim 1 should be patentable over Burtschi in view of Arnott. Neither Pearson nor Bronson teaches or suggests an electro-larynx having a linear transducer. Therefore, claim 1 should be patentable over Burtschi in view of Arnott, and further in view of Pearson and Bronson. Claims 10 and 11 provide further limitations to claim 1, and therefore, should be patentable over the cited references.

Claims 23-25

In Item 14, claims 23-25 were rejected under 35 U.S.C. 103(a) as being unpatentable over Burtschi in view of Harbeson as applied to claim 1, and further in view of Pearson and Bronson.

Claims 23-25 depend from claim 22. As discussed above, the independent claim 22 should be patentable over these references because none of the prior art references teaches or suggests an electro-larynx having a waveform generator configured to selectively generate an input signal, which has a harmonic structure corresponding to a normal glottal excitation. Claims 23-25 provide further limitations to claim 22. Therefore, claims 23-25 should be patentable over the cited references.

Serial No.: 09/475,390
Examiner: Lao, Lun S.
Reply to Office Action of July 15, 2004

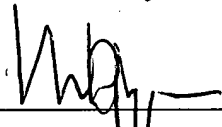
Conclusion

The Applicant, accordingly, respectfully submit that in view of the preceding amendments and arguments, claims 1-25 are patentable over the cited references, whether considered alone or in combination, and respectfully request reconsideration and withdrawal of the rejections of these claims under 35 U.S.C. 102(b) and 103(a). If a telephone conference will expedite prosecution of the application the Examiner is invited to telephone the undersigned.

No additional costs are believed to be due in connection with the filing of this paper. However, the Commissioner is hereby authorized to charge any additional fees, or credit any overpayment, to our Deposit Account No. 50-1133.

Respectfully submitted,
McDermott Will & Emery LLP

Date: 13 SEPT 2004



Mark G. Lappin, P.C., Reg. No. 26,618
Attorneys for Applicants
28 State Street
Boston, MA 02109-1775
Telephone: (617) 535-4000
Facsimile: (617) 535-3800